Role of Physical Performance Component Evaluations in Occupational Therapy Functional Assessment

Virgil Mathiowetz

Key Words: activities of daily living evaluation • pinch functions • pinch strength test

In the 1970s, occupational therapy assessments tended to focus on physical performance component (PPC) evaluations such as strength and range of motion; assessment of occupational performance played a secondary role. Given changes within and outside the profession of occupational therapy, it is time for the assessment of occupation and role performance to assume a primary role, while PPC evaluation should shift to a secondary role. Although PPC evaluations may be less prominent than in the past, they will continue to play an important role in occupational therapy practice and research. Therapists need to be critical consumers of PPC measurement tools because many require further development to validate their use for occupational therapy purposes.

Where We Have Been

In the mid-1970s, in adult rehabilitation settings, evaluation of PPCs was a primary focus in most occupational therapy assessments. In contrast, evaluation of occupational performance (with activities of daily living [ADL] evaluations) was usually secondary. This arrangement of priorities was evident in treatment as well—the primary focus was on remediation of PPC deficits, whereas the remediation of occupational performance deficits was secondary. The assumption was that if PPC deficits could be normalized, then deficits in occupational performance would also be remediated. Because more exercise appeared to be the most direct treatment for PPC deficits, exercise tended to be used more frequently than purposeful activities. When PPC deficits could not be normalized, then compensatory strategies were used to manage the ADL deficits. For example, if a client with hemiplegia was unable to develop sufficient motor control of the involved arm to assist dressing, then one-handed dressing techniques were taught. Typically, the compensatory approach was not emphasized until shortly before discharge, that is, until the therapist was convinced that the PPC deficits could not be normalized.

PPC evaluations took priority over occupational performance evaluations in occupational therapy assessments and treatment for a number of reasons. First, occupational therapy was and continues to be highly influenced by the medical model and its reductionistic view of a person. The medical model assumption is that if the component parts of a person are normalized, the person will be healthy and functional. Because experimental research is consistent with the reductionist view, more evaluation instruments are developed to assess component parts of a person than to assess the whole...
The rationales that supported the prioritization of PPCs over occupational performance does not hold today for several reasons. First, the reductionistic view of a person has been questioned as the only model for studying human behavior both within (Yerxa, 1991) and outside (Reed, 1982) the profession of occupational therapy. Holistic and naturalistic models have been proposed as alternatives (Yerxa, 1991). In these models, human behavior is studied by observing the whole person performing in the natural environment. Qualitative research methods are accepted in this model and in many cases promoted as superior to quantitative methods (Yerxa, 1991). Second, there are improved methods of assessing occupational performance, such as the Canadian Occupational Performance Measure (COPM) (Law et al., 1991) and the Assessment of Motor and Process Skills (AMPS) (Fisher, 1992) that are reasonably objective and quantitative. Third, the assessment of occupational performance or functional outcomes has achieved enhanced status in a health care system that is struggling to contain costs (Mather, in press). Fourth, the assumption that normalizing PPCs will result in independence in occupational performance needs to be questioned. The kinesiology literature suggests that motor learning is specific to a task (i.e., learning one task has little carryover to learning a second task, even if the two tasks are very similar) (Henry, 1968; Schmidt, 1988). In other words, the most effective way to learn a specific functional task is to practice that task. Rote exercise may be effective in improving PPCs like strength, but there is no evidence that it is the most effective way to improve specific functional skills such as eating and dressing. In conclusion, a number of theoretical and practical reasons, originating from within and outside the profession, suggest that occupational performance should be the primary focus of occupational therapy assessments.

There is a need for both outcome and process-oriented assessments of occupational performance. Various outcome-oriented assessments such as the COPM and the Functional Independence Measure (FIM) (Hamilton, Granger, Sherwin, Zielezny, & Tashman, 1987) are being developed to document the effectiveness of occupational therapy and rehabilitation programs. Process-oriented approaches have become more prevalent in the study of motor behavior for the purpose of understanding the underlying mechanisms that contribute to performance (Schmidt, 1988). Process-oriented assessments of reaching movements with computerized movement analysis systems have been reported in the physical therapy and occupational therapy literature (Kluzik, Fettes, & Coryell, 1990; McPherson et al., 1991). Although these methods have great potential for research, their potential as a clinical assessment tool is limited due to their cost and the specialized training needed for their use. The AMPS (Fisher, 1992, in press-a, in press-b) offers a clinically relevant example of a process-oriented assessment that focuses on occupational performance rather than on PPCs.

Although PPC evaluations are not as important as occupational performance evaluations, they should not be eliminated from the occupational therapists' repertoire of assessment instruments. PPC evaluations have importance in clarifying the cause of occupational performance deficits and assisting in treatment planning. The role of PPC evaluations in relation to other occupational therapy assessments is illustrated in Figure 1.
Role Performance
Worker, Volunteer, Homemaker, Student, Parent, Spouse, Friend

Occupational Performance
Activities of Daily Living, Work, Play and Leisure

Performance Components or Enablers
Sensory Motor (e.g., sensation, perception, range of motion, strength, endurance, coordination), Cognitive, Psychological

Figure 1. Framework describes how the assessments of role performance and occupational performance should have priority over the assessments of performance components or enablers.

The framework described in Figure 1 is very similar to the conceptual framework of the Occupational Therapy Functional Assessment Compilation Tool (OT FACT) (Smith, 1990). It provides an efficient means for summarizing and documenting assessment data using computer software. When OT FACT is used to guide the evaluation process, roles and occupational performance are evaluated before PPCs.

The framework described in Figure 1 also can be related to the World Health Organization (WHO) classification of the consequences of disease (see Table 1) (Christiansen & Baum, 1991; Mather, 1993; WHO, 1980). Thus a deficit in role performance results in a handicap, a deficit in occupational performance (e.g., inability to dress oneself) results in a disability, and a deficit in performance components results in an impairment. This classification suggests that a disease or injury causes impairments and impairments cause disabilities or handicaps. Thus, a therapist who needs to determine the cause of a handicap or disability needs to evaluate selected PPCs.

Need for Further Development of Evaluations

There is a need for development of better evaluations of role performance, occupational performance, and performance components to serve occupational therapy practice and research. This includes a need for both qualitative and quantitative assessment tools. Because the focus of this paper is on PPCs, my comments center on improving the usefulness of these tools for occupational therapy purposes.

A good evaluation or test must be reliable and valid for its specific purposes. In addition, an occupational therapy evaluation should be related to the occupational performance of clients with disabilities. These requirements raise several questions related to the evaluation of our clients. For what types of disabilities are our existing tests reliable and valid? Are the PPC evaluations we use related to occupational performance? If not, why are we using them?

There is a broad range of PPCs evaluated by occupational therapists, but I will critique the reliability and validity of only grip and pinch strength evaluation tools (see Mathiowetz, 1991b, for a more detailed critique) as an example of how we must address these questions. Similar critiques need to be done for other PPC evaluations.

Issues Related to Population-Specific Reliability

One type of reliability of concern to those who measure PPCs of clients with disabilities is population-specific reliability. It has been defined as "the degree of reliability that a test has for a specific group being measured" (Rothstein, 1985, p. 9). According to Rothstein, we "must consider how closely a sample mirrors a patient population before we can assume that a measurement will be reliable for that population" (p. 9). Because most of the reliability studies in the literature were performed on subjects without disabilities, we must be cautious about applying these results to various populations of subjects with disabilities. For example, good test-retest and interrater reliability have been reported for grip strength of normal subjects (Mathiowetz, Weber, Volland, & Kashman, 1984). Would comparable reliability be achieved with subjects with disabilities who might have problems with pain, cognition, or perception?

There are some reports of population-specific, test-retest reliability for grip strength evaluations. Fowler and Gardner (1967) reported very high test-retest reliability.
In the first example, grip and pinch strength are only two of many elements that would need to be evaluated. In the latter example, grip and pinch strength are not relevant elements to evaluate. The concern of content validity is that a test contain a sample of elements that are representative of the construct of interest.

Another example of content validity is provided by a critical look at the Jebsen Taylor Hand Function Test (Jebsen, Taylor, Trieschmann, Trotter, & Howard, 1969), the hand function test most frequently reported in the literature. An occupational therapist might question whether items in this test (e.g., writing with nondominant hand or stacking checkers) are representative of everyday tasks and whether the subtests included in the test actually represent the tasks of interest. For example, does turning over 3-in. by 5-in. index cards actually simulate page turning, and does picking up kidney beans with a spoon and placing them into a can in front of a person actually simulate eating? A recent study (Mathiowetz, 1991a) demonstrated clearly that these subtests were poor simulations of the actual tasks. Clearly, the content validity of this test is questionable and it may need a major revision to be a valid instrument for evaluating hand function.

Issues Related to Construct Validity

Basic to construct validity are the operational definitions of the constructs as well as the purposes of the evaluation instruments. For both grip and pinch strength evaluations, operational definitions and purposes have been reported. The purposes for evaluating grip or pinch strength are to compare a client’s strength relative to some normative standard (Kellor, Frost, Silberberg, Iversen, & Cummings, 1971; Trombly, 1989); to establish a baseline from which to assess treatment effectiveness (Fess, 1990); and to assess a client’s sincerity of effort (Gilbert & Knowlton, 1983; Hildreth, Breidenbach, Lister, & Hodges, 1989; Niebuhr & Marion, 1987, 1990; Smith, Nelson, Sadoff, & Sadoff, 1989; Stokes, 1983). The issue of whether these purposes are valid for occupational therapy is the domain of construct validity studies implemented by occupational therapists.

Issues Related to Content Validity

Content validity is concerned with whether an instrument reflects the construct or variable of interest (Rothstein, 1985). For example, if the construct of interest were hand function, we would need to determine all the relevant elements. If hand function were defined as the group of component skills needed to perform functional tasks, then the elements might include hand strength, range of motion, and sensation. In this case, grip and pinch strength assessments alone would not be representative of all elements of hand function. That is, dexterity, sensation, and other elements also needed to be evaluated. In contrast, if hand function were defined as the ability to perform common, everyday tasks, then the elements might include tasks of eating, brushing teeth, buttoning, and so on. In this case, grip and pinch strength assessments would be inappropriate elements of hand function. In the first example, grip and pinch strength are only two of many elements that would need to be evaluated. In the latter example, grip and pinch strength are not relevant elements to evaluate. The concern of content validity is that a test contain a sample of elements that are representative of the construct of interest.
(Tiffin, 1961), a dexterity test, was designed to aid in the selection of employees for industrial jobs. Is it valid to use this test to determine the need for occupational therapy? Reliability studies, reported in the test manual, have been on normal subjects only. Is the test reliable when used with people experiencing various disabilities? A critique of dexterity tests used by occupational therapists would address whether each test was reliable and valid for occupational therapy purposes as well as include specific recommendations for research that would be needed to achieve this goal. Most PPC evaluations have not been evaluated for concurrent validity with occupational performance. A good example of the type of study needed is one by Titus, Gall, Yerxa, Roberson, and Mack (1991). Here, the perceptual performance of persons who had strokes was compared with their ADL performance. Studies like this would provide information on which performance components are most critical to occupational performance and in turn, determine which performance components are most important to evaluate and treat for a specific client with a specific disability.

Conclusion

PPC evaluations should play a secondary role in occupational therapy assessments, whereas outcome and process-oriented assessments of role and occupational performance should play a primary role. After these outcome and process-oriented assessments have been completed, selected PPC evaluations will be needed to clarify the cause of any functional deficit. For example, knowing that a client’s occupational performance deficits were due to cognitive deficits rather than to motor deficits would provide essential information for treatment planning. PPC evaluations may be more sensitive to change than occupational performance evaluations and thus may continue to be useful in documenting treatment effectiveness.

Research is needed to determine which PPC evaluations are most related to occupational performance. Performance component evaluation tools that are closely related to occupational performance should be retained and developed further; those that are not closely related should be dropped from the occupational therapy repertoire of evaluation tools. Reliable and valid PPC evaluations are essential for conducting experimental research related to treatment effectiveness; they will continue to serve an important role in occupational therapy practice and research.

Acknowledgments

This manuscript was based on a paper presented at the Symposium on Measurement and Assessment: Directions for Research in Occupational Therapy at the University of Illinois at Chicago, October 16–18, 1991. The symposium was jointly sponsored by the American Occupational Therapy Association, the American Occupational Therapy Foundation, and the Occupational Therapy Center for Research and Measurement at the University of Illinois at Chicago.

I want to thank Anne Fisher, SXD, OTR, FAOTA, and my colleagues at the College of St. Catherine, especially Julie Bass Haugen, PhD, OTR, Sharon Stoffel, MA, OTR, and Sally Ryan, COTA, Rohn, for helpful comments on drafts of this article.

References


Physical Therapy, 70, 65-78.


